Use of satellite data in habitat classification for protected resources

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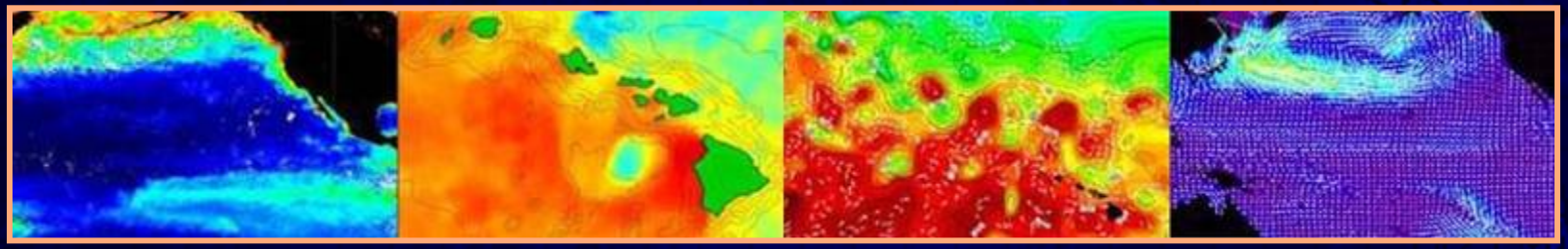

Contents

Satellite data

Why use satellite data:

Basin scale coverage

Many near real-time products available

Easy incorporation to models/ studies (In house processing/ storage of multiple products by PIFSC OceanWatch node)

Uses:

Regional Indicators/Indicator of features

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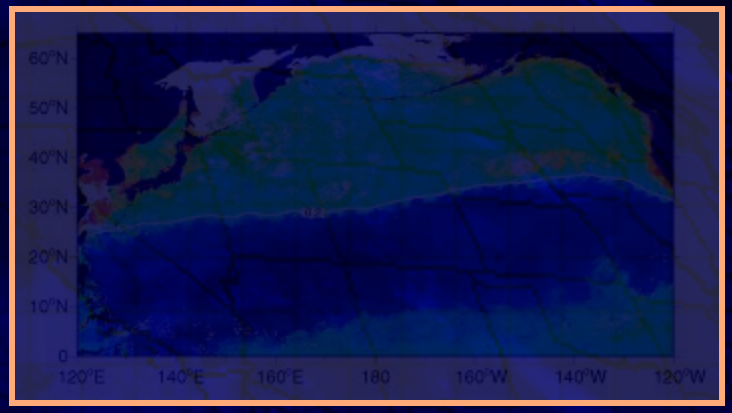
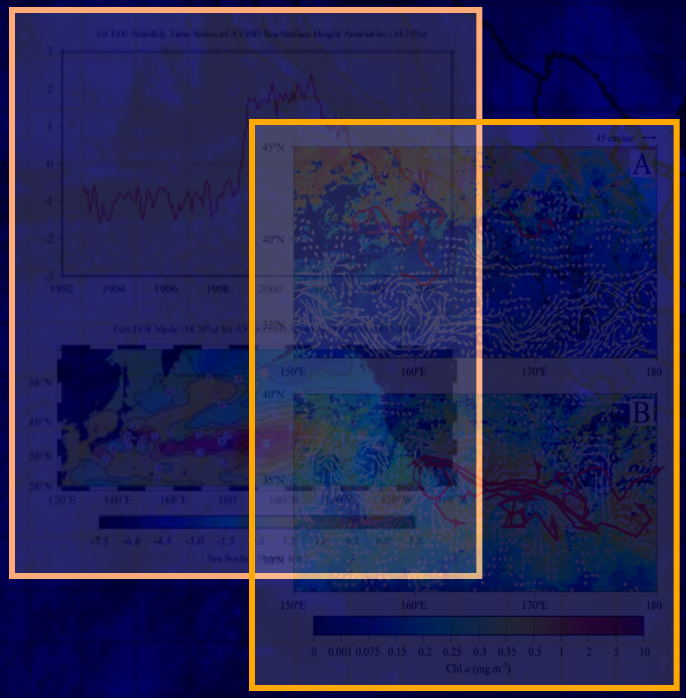
Ecosystem/Habitat Studies

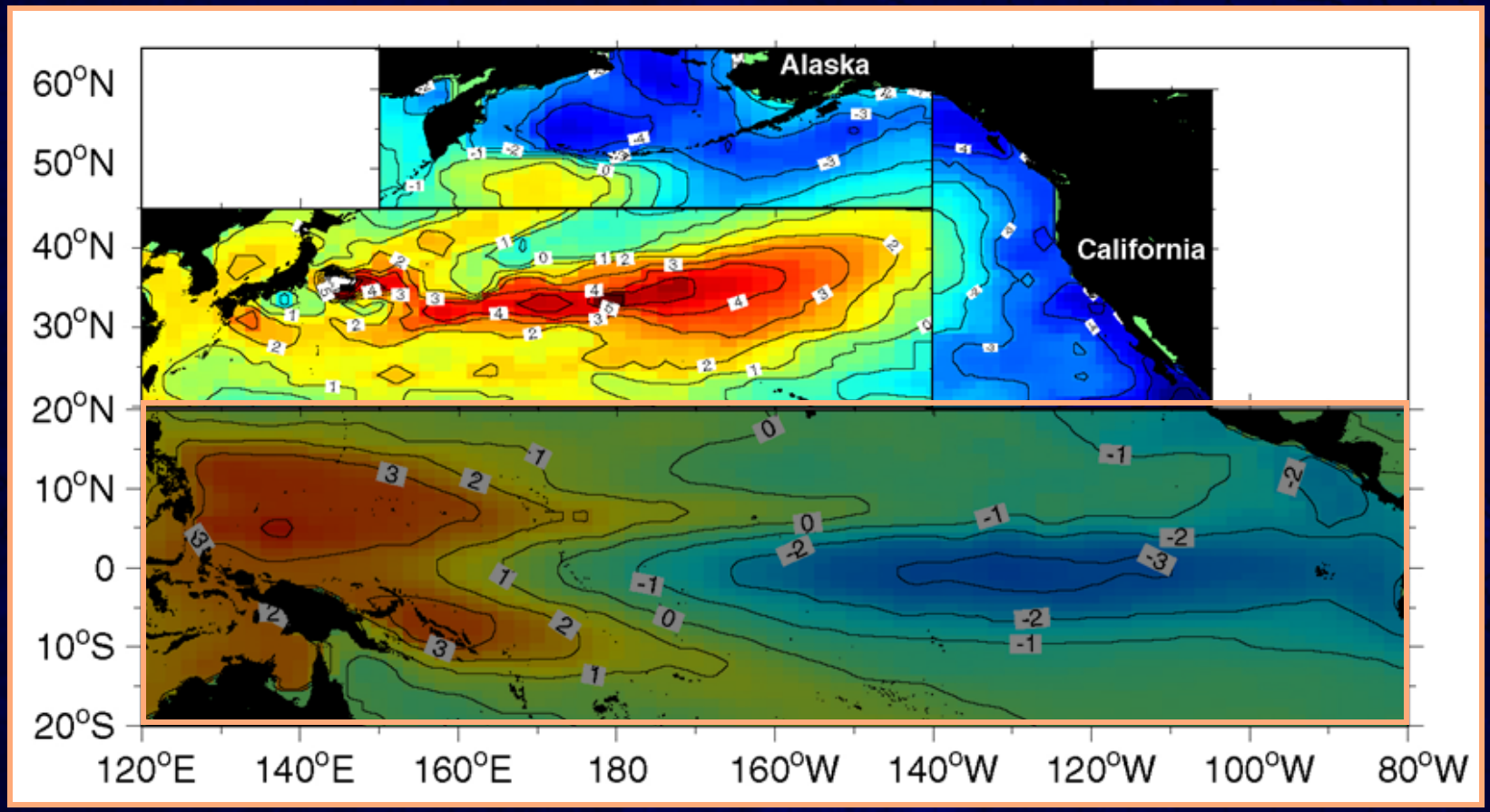




Regional Indicators

Use satellite data to monitor meso/basin scale changes in different regions across Pacific

EOF Analysis of SSH provides index of regional conditions



Regional Indicators

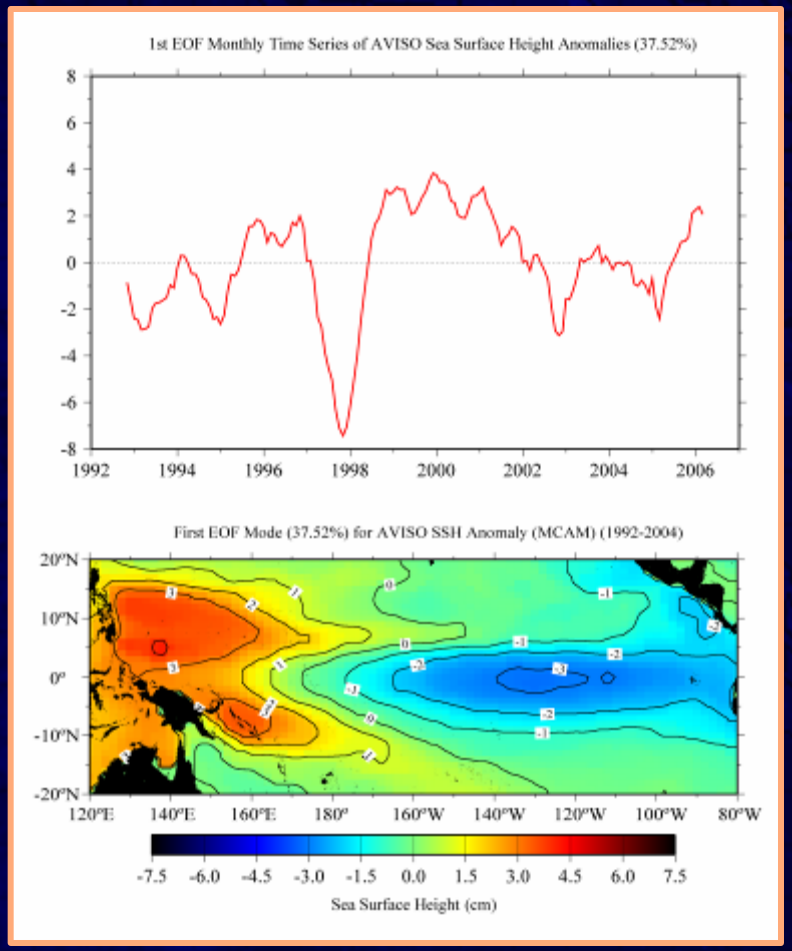
EOF of equatorial region indicator of ENSO events

Built easily from SSH data

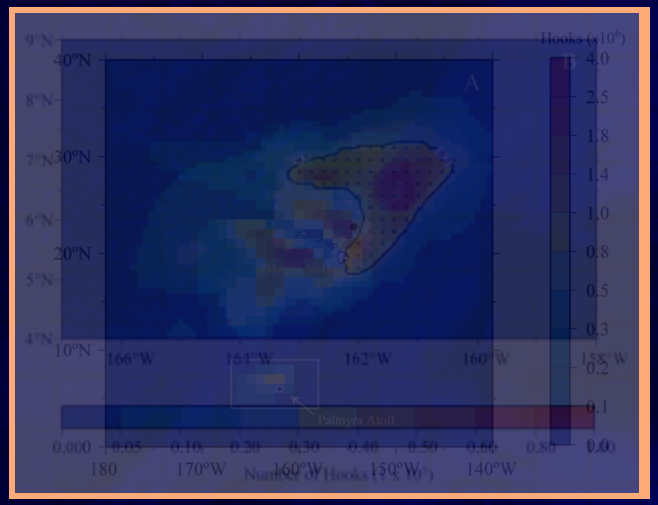
Indicative of subsurface changes, can be used as proxy for subsurface conditions

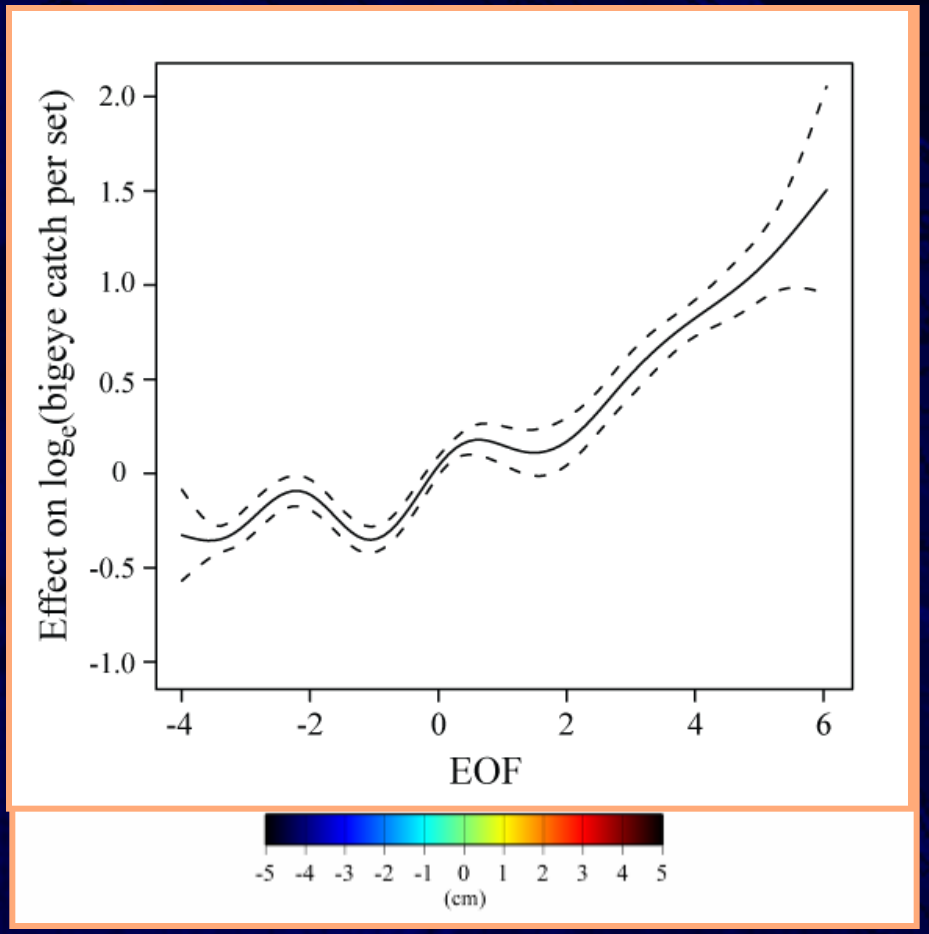
Less observed variability than SST or SLP based ENSO indicators

Can be used in Habitat analyses (e.g. Bigeye at Palmyra)



Regional Indicators – Bigeye Habitat





Palmyra Area small but important area for longline fishery

Apparent correlation between bigeye cpue and El Niño Indicator (eyeball method)

Incorporate indicator into GAM model (cpue~x,y,t,EOF)

Model results show higher bigeye CPUE occurs in El Niño years

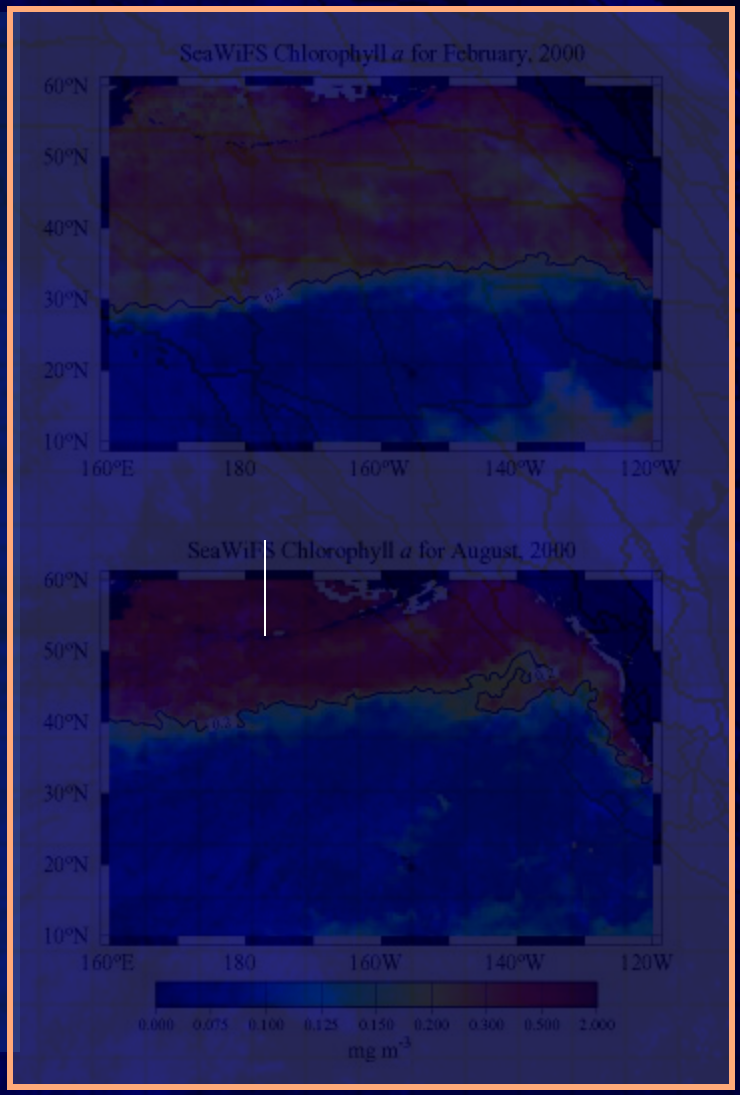
Indicators of features

Basin wide feature with 1000 km north-south migration

Southern minimum ~February
Northern maximum ~August

Boundary hi surf chl lo chl

TZCF represent key migration and forage habitat for loggerhead turtles, albacore tunas, and monk seals



Hawaiian Monk Seals

- Born and weaned in NWHI
- Juvenile survival focus of study for many years
- Mortalities due to starvation are observed

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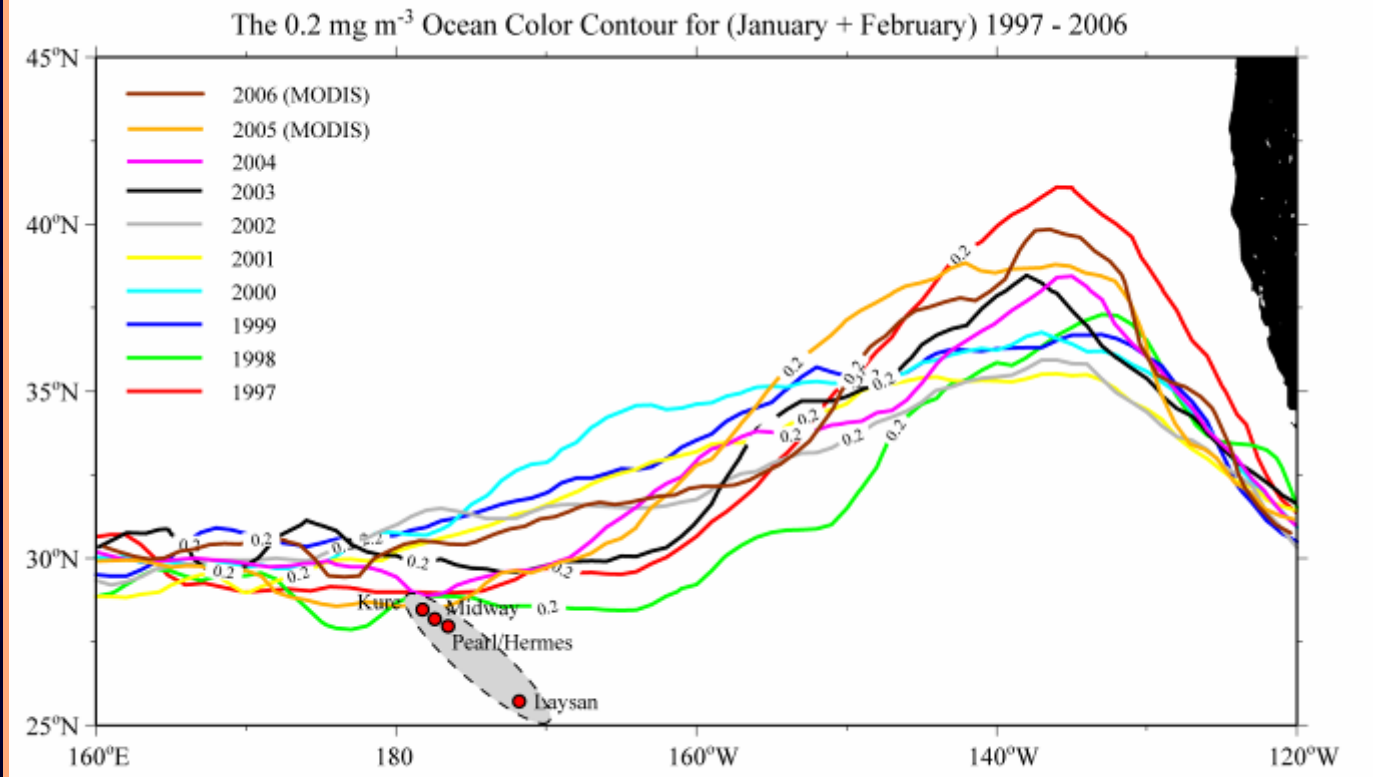
Indicators of features – TZCF

Hypotheses: TZCF winter lat - correlated with MS survival

Effect should be strongest at northernmost atolls

Should involve time lag

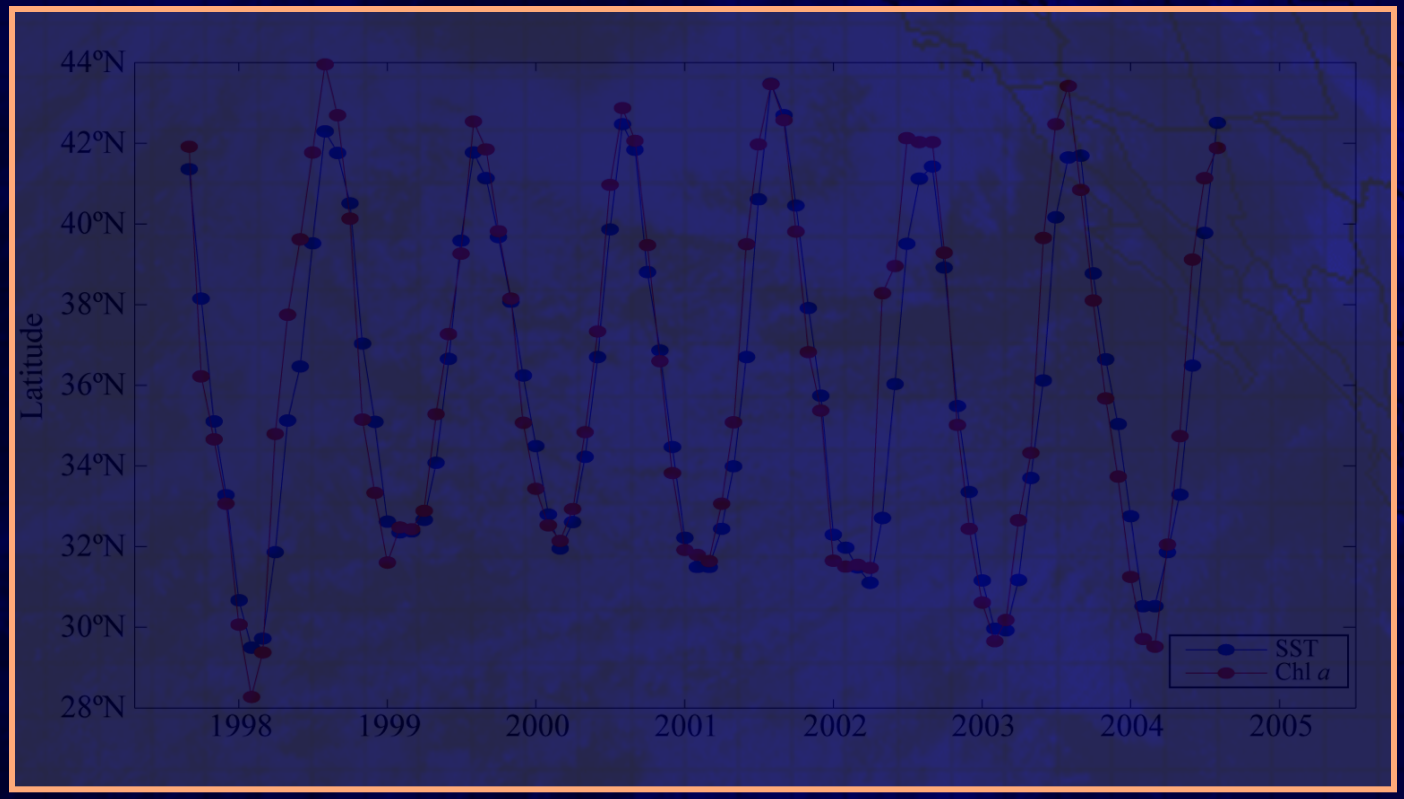


Indicators of features – TZCF|SST

Can use 18°C SST as proxy for TZCF (180°-160°W Jan-Feb

Winter SST then matched to MS Data (1984-2004)

Use this indicator as model effect for MS survival

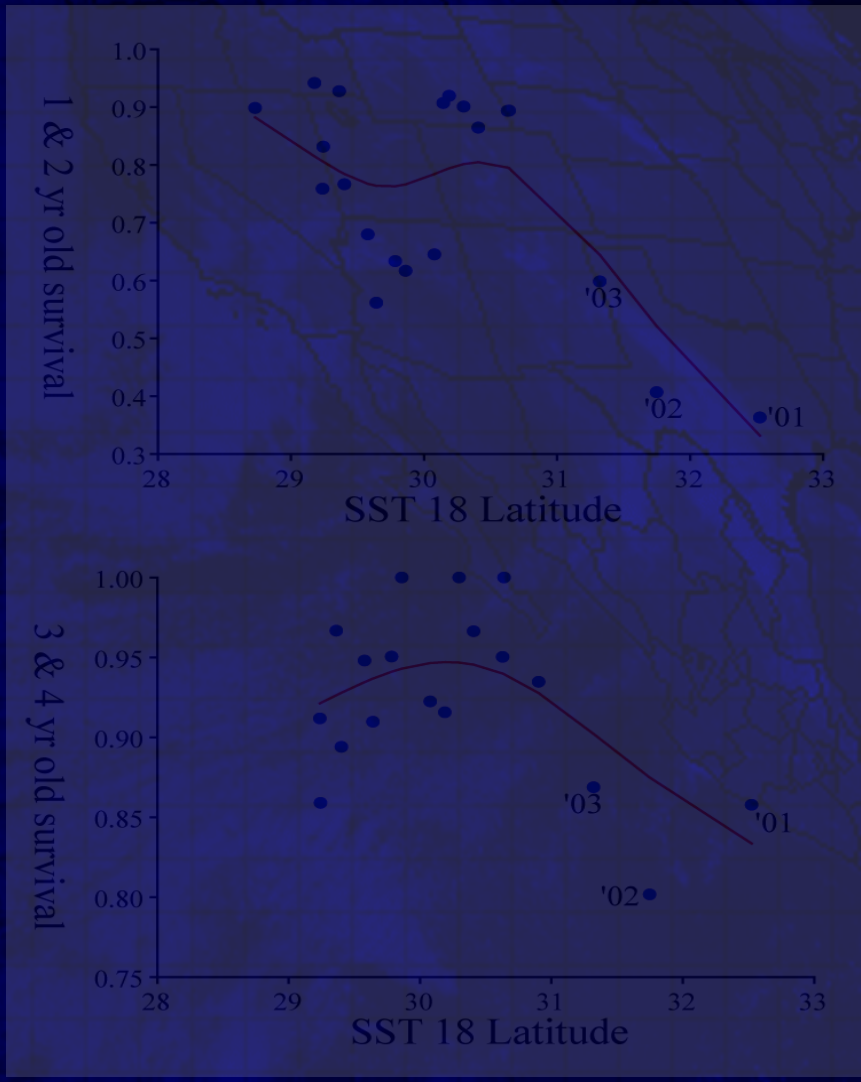


Indicators of features – TZCF|SST

Juvenile survival* (top) dependent on southern position of SST/TZCF front (2 year lag in indicator)

Pups born in 2001-2003 show decline in survival

Should see increase in survival based on indicator rise from 2004



***1&2 yr old: Lisianski/PHR/Midway/ Kure**
***3&4 yr old: PHR/Midway/Kure**

Assessing juvenile loggerhead "hot spots"

Tag affixed to turtle's shell with epoxy

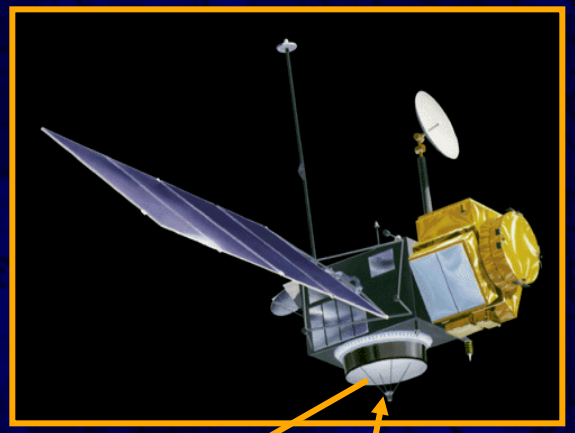
Animal released, tag transmits to ARGOS satellite, which is then processed and sent to our computers

Animals tagged are either ones caught in fishery or ones raised in captivity

What comes in is raw location (x,y) data

What about the env is important?

Turtles from Japan



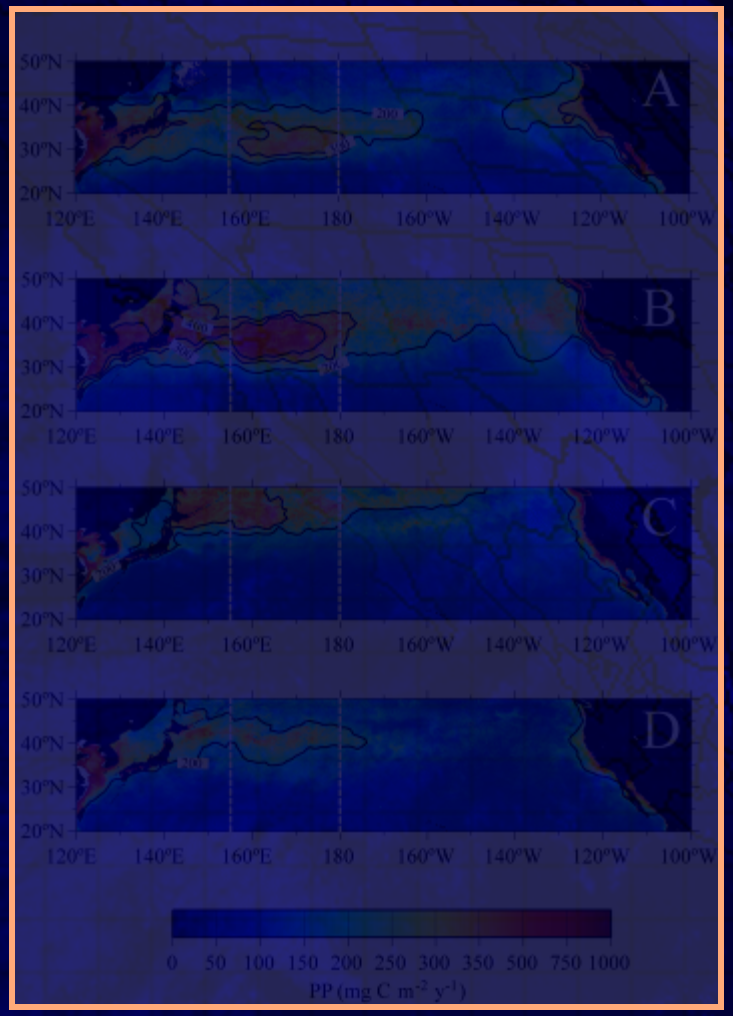
The Kuroshio Extension Bifurcation Region

MODIS primary productivity

(BF model)

Quarters 1-4 2003

Productive area moves south in winter, north in fall



The Kuroshio Extension Bifurcation Region

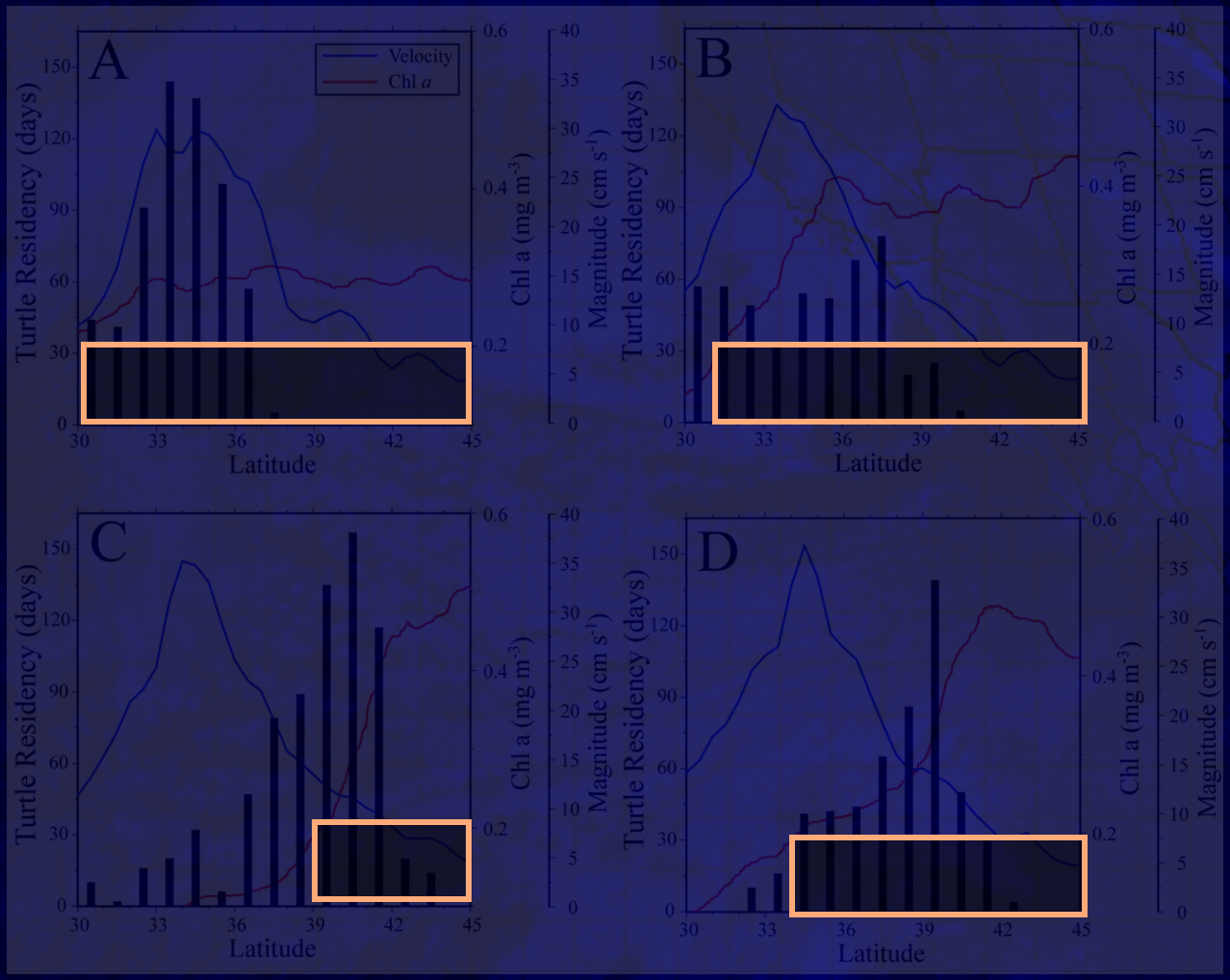
Geostrophic currents and ocean color for September 6-13, 2003

Geostrophic currents and ocean color for March 5-12, 2004

Turtles follow front rather than currents

The Kuroshio Extension Bifurcation Region

Turtles follow front (red) rather than currents (blue)



Albacore tuna habitat mapping

Creating maps of albacore pref habitat from env. Data (SST, SSH, Chl *a*

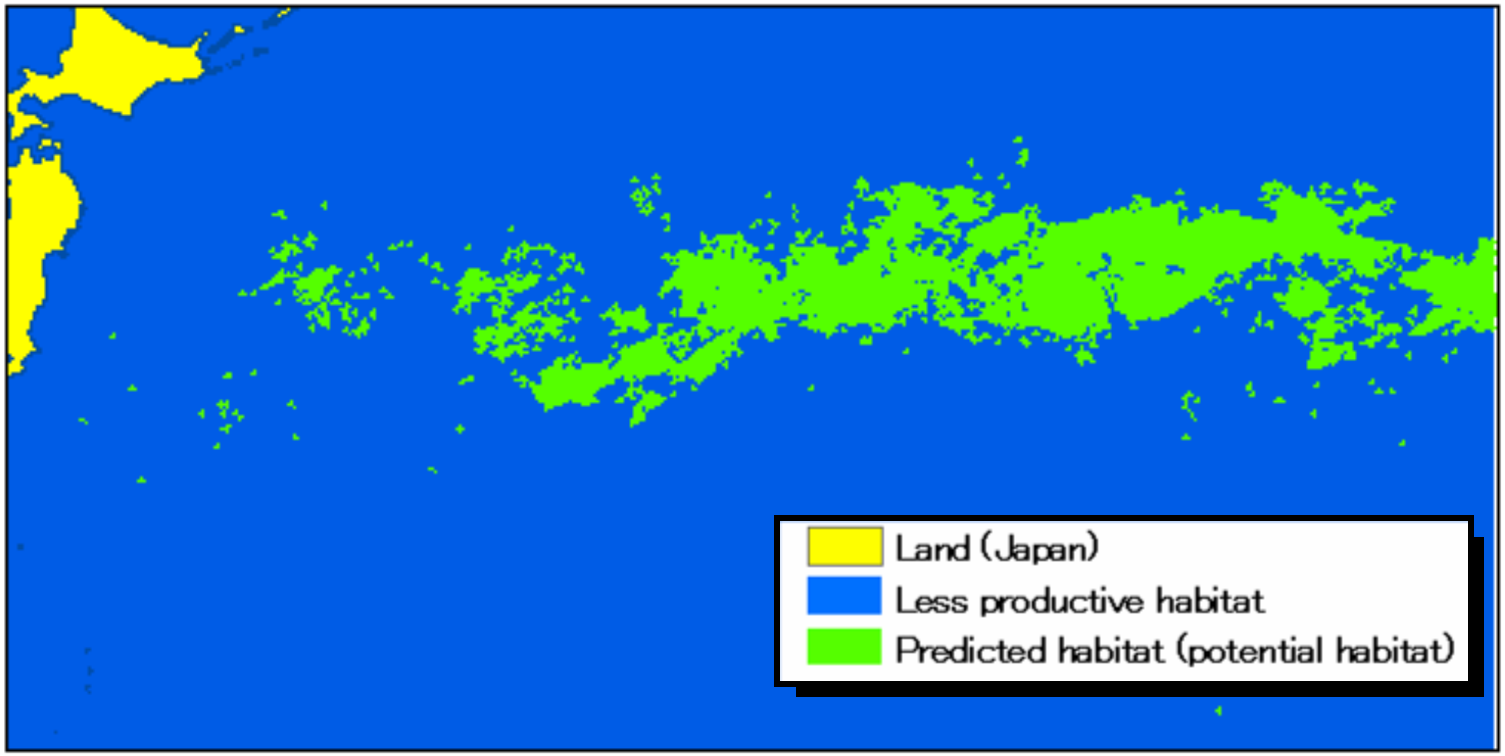
Have Japanese longline albacore data from 1998-2004

Get habitat ranges from histograms of environmental data to build habitat maps

Albacore tuna habitat mapping

Example of a simple prediction map for albacore tuna from environmental variables

Future work involving gradation map (% pot habitat)



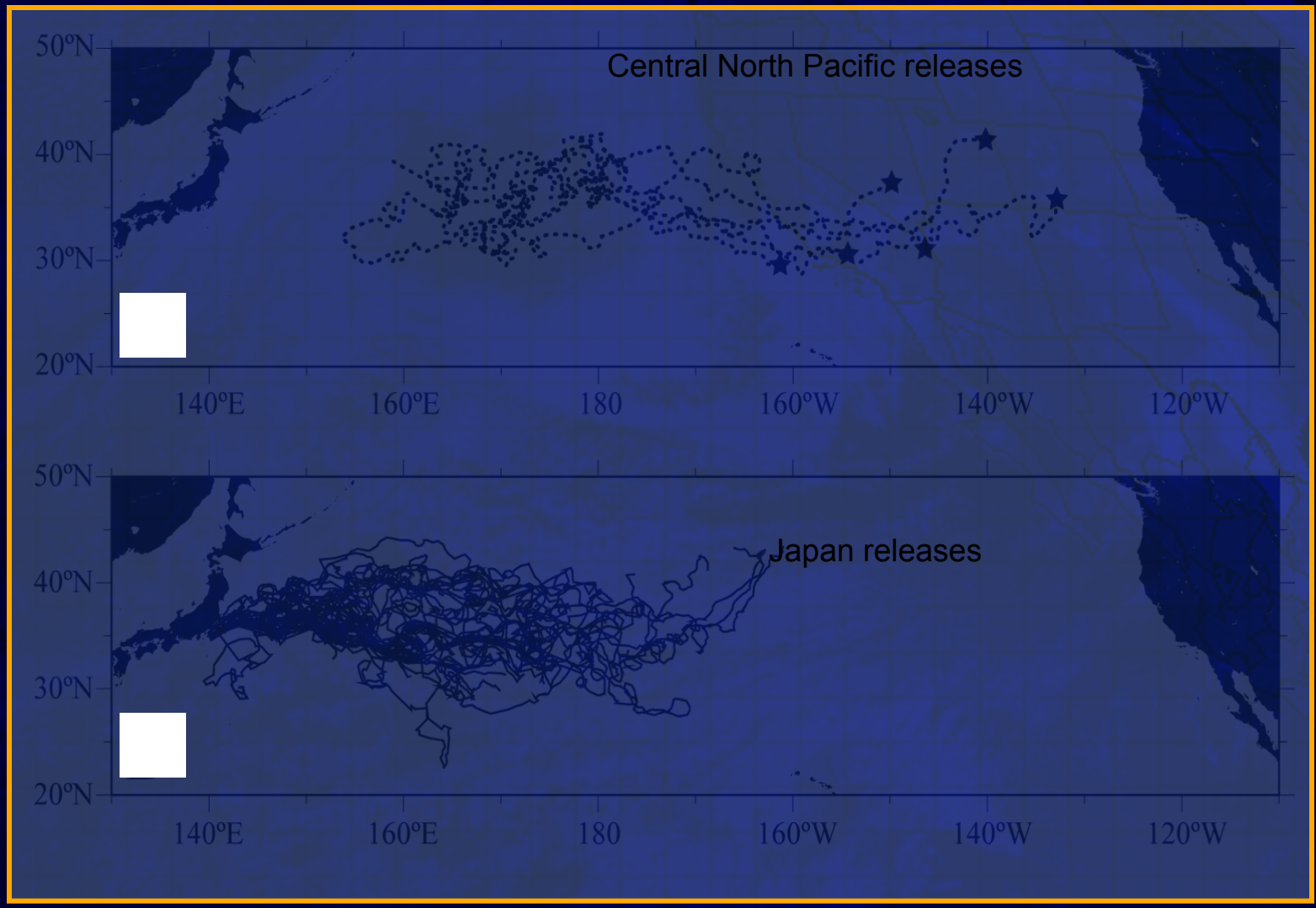
Quick Summary

- The Ecosystems and Oceanography Division incorporates satellite remotely-sensed data into many habitat studies
- Satellite data provides us with a basin wide snapshot of environmental conditions from multiple angles on various time scales
- These data can be used to build indicators and/or incorporated directly into habitat studies
- These data will only increase in their value as coverage/abilities progress


NASA


NOAA

Assessing juvenile loggerhead “hot spots”



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